

monteLLTB

Description

We embeded the `vd2020` code (available [here](#)) into `montepython` to create `monteLLTB`: a cosmological solver and sampler for the ALTB model. Taking advantage of the likelihood and sampler structure of `montepython` we include the ALTB cosmology by adapting the likelihood computation scheme. We started defining the method `ini_LLTB` in `sampler.py`, which executes the solver `vd2020` considering the current sampled point. Then, a call for `ini_LLTB` is included into the method `compute_lkl` to pass the ALTB solution to the corresponding likelihood. Note that this is possible since the method of the likelihood `loglkl` now receives a new argument `LLTBin`, which contains the ALTB solution. We also modified the likelihoods in order to compute the observables according the ALTB predictions. Note that the output of `vd2020` is managed by the file `LLTB_functions.py`, which contains definitions of distances and metric functions. Finally, it is important to mention that we modified `vd2020` in order to customize the management of error, output precision and outputted functions. However, the core of the ALTB solver, the implementation to compute $R(t, r)$ through Carlson's elliptic integrals ([Valkenburg 2011](#)), remained unchanged.

Prerequisites

- CLASS: Cosmic Linear Anisotropy Solving System
- Monte Python (version \geq v3.3.0) with the Planck 2018 likelihoods
- scikit-learn

Installation

To install `monteLLTB` you should first compile the `vd2020` following the instructions on `vd2020/README.PDF`. Once `vd2020` is installed you should modify `montepython` by doing:

```
cp -r montepython_files/* /path-to-your-montepython/
```

then modify the file `default.conf.template` to include the path to your `vd2020` installation (besides the path to `class` and `clik` likelihoods). Set `default.conf.template` as your default configuration.

Repeat the procedure for `class` by doing:

```
cp -r class_files/* /path-to-your-class/
```

Compile `class` again and have fun with inhomogeneous cosmology!

Usage

`monteLLTB` was first introduced in [Camarena et al. 2021](#), please cite this paper if you make use of the code.